UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/893,488	06/29/2001	Tomoaki Kato	Q63852	6301

7590 07/27/2005

SUGHRUE, MION, ZINN, MACPEAK & SEAS, PLLC
2100 Pennsylvania Avenue, N.W.
Washington, DC 20037-3202

EXAMINER	
LEURIG, SHARLENE L	

ART UNIT	PAPER NUMBER
2879	

DATE MAILED: 07/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

SM

Office Action Summary	Application No.	Applicant(s)	
	09/893,488	KATO ET AL.	
	Examiner	Art Unit	
	Sharlene Leurig	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 May 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15 and 21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15 and 21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1-15 and 21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 1 and 8 recite a spark plug having an igniter with an "unfused" igniter section and a "fused" weldment section. The specification does not support such a claim limitation. Page 3, lines 24-31 of the specification, cited by the applicant as providing support for these new limitations, simply recites that the igniter is a portion of a welded metal chip that "is not influenced by a composition change", in comparison to another portion of the welded metal chip, which is alloyed during welding with a material of a ground electrode or a center electrode. Therefore the chip may be of a fused noble metal material, that when welded to the ground or center electrode has a portion containing only the fused noble metal and another portion containing the fused noble metal and the material of the ground or center electrode. For the purposes of continued examination, the claim will be interpreted as meaning that the igniter includes an igniter section free from the material

of the ground or center electrode and a weldment section containing both the metallic material of platinum or iridium and the material of the ground or center electrode.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-4 and 7 stand rejected under 35 U.S.C. 102(b) as being anticipated by Mamoru et al. (JP 06-338376) (of record).

Regarding claim 1, Mamoru discloses a spark plug with a center electrode (Figure 1, element 3) and a ground electrode (Figure 1, element 4) "which forms the spark discharge gap G" between it and the center electrode (paragraph 0009, line 6). The igniter (Figure 2, element 12), welded to the ground electrode in the example illustrated by Figure 1, faces the spark discharge gap, G. Mamoru discloses that the "precious alloy electrode" may be formed in the igniter on the ground electrode or the center electrode (paragraph 0032, line 5). The gas concentration of nitrogen and oxygen of the Pt-nickel alloy composing the igniter is 100 ppm or less (paragraph 0029, line 5). The igniter (12) is welded to the ground electrode, as shown in Figure 2 (paragraph 0019). The igniter includes an igniter section (19) composed of a metallic material whose principal component is one of platinum and iridium and a weldment section (20) composed of the metallic material of the igniter section and a material of

the ground electrode (paragraph 0022). At least a portion of the igniter section is not blended with the material of the ground electrode, as it contains only the precious alloy material of the plug (18) even after welding, since Mamoru describes portion 19 as a "precious alloy layer", which is another term for the precious alloy electrode (13) which may be any of the alloys disclosed in paragraph 0014. Upon applying the laser to the plug (Figure 2b), the plug (18) composed of the precious alloy is melted and then solidifies. However, the precious alloy is not entirely unified with the ground electrode material. If it were, there would be no need for the seam soldering along the perimeter of the noble-metals material (18), as disclosed by Mamoru in paragraph 0019. Furthermore, Mamoru discloses a change in composition along the thickness of the ground electrode, as the noble metal content decreases from the precious alloy layer (19) to the ground electrode (21) (paragraph 0022). Therefore the melted and solidified precious alloy layer (19), aka the precious alloy electrode (13), is not entirely blended with the material of the ground electrode, and therefore contains at least a portion free of the ground electrode material.

Regarding claims 2 and 3, the principal component of the igniter consists of at least one of the following metallic materials: platinum or a platinum alloy such as a "Pt-nickel alloy" or an "Ir-nickel alloy" or a "Pt-Ir-nickel alloy" (paragraph 0014, line 3).

Regarding claim 4, the Pt-nickel alloy consists of 20% of the weight in nickel, fitting into the claimed range of 2% to 40% of total mass (paragraph 0017, line 2).

Regarding claim 7, Mamoru further discloses the spark plug to be designed in such a way to "prevent the injury on an internal combustion engine," which is intrinsically a gas engine, in which it is mounted (paragraph 0005, line 4).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 5-6 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Mamoru et al. (JP 06-338376) (of record) in view of Abe et al. (6,215,234) (of record).

Mamoru discloses a spark plug with all the limitations discussed above but lacks a spark discharge gap defined by the range of 0.2 mm to 0.6 mm.

It is well known in the art to lower the required voltage of a spark plug.

Abe teaches a spark discharge gap within a range of 0.2 mm to 0.4 mm (column 2, line 5), which fits within the claimed range of 0.2 mm to 0.6 mm and is therefore not more than 0.6 mm. Abe teaches this spark gap range in order to lower the required voltage for producing sparks (column 2, lines 15-17).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Mamoru's spark plug with a spark discharge gap fitting with a range of 0.2 mm to 0.4 mm in order to lower the required voltage to produce sparks, as taught by Abe.

7. Claims 8-12, 15 and 21 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Mamoru et al. (JP 06-338376) (of record) in view of Chang et al. (6,045,424) (of record).

Regarding claim 8, Mamoru discloses a spark plug with a center electrode (Figure 1, element 3) and a ground electrode (Figure 1, element 4) "which forms the spark discharge gap G" between it and the center electrode (paragraph 0009, line 6). The igniter (Figure 2, element 12), welded to the ground electrode in the example illustrated by Figure 1, faces the spark discharge gap, G. Mamoru discloses that the "precious alloy electrode" may be formed in the igniter on the ground electrode or the center electrode (paragraph 0032, line 5). The gas concentration of nitrogen and oxygen of the Pt-nickel alloy composing the igniter is 100 ppm or less (paragraph 0029, line 5). The igniter (12) is welded to the ground electrode, as shown in Figure 2 (paragraph 0019). The igniter includes an igniter section (19) composed of a metallic material whose principal component is one of platinum and iridium and a weldment section (20) composed of the metallic material of the igniter section and a material of the ground electrode (paragraph 0022). At least a portion of the igniter section is not blended with the material of the ground electrode, as it contains only the precious alloy material of the plug (18) even after welding, since Mamoru describes portion 19 as a "precious alloy layer", which is another term for the precious alloy electrode (13) which may be any of the alloys disclosed in paragraph 0014. Upon applying the laser to the plug (Figure 2b), the plug (18) composed of the precious alloy is melted and then solidifies. However, the precious alloy is not entirely unified with the ground electrode

material. If it were, there would be no need for the seam soldering along the perimeter of the noble-metals material (18), as disclosed by Mamoru in paragraph 0019. Furthermore, Mamoru discloses a change in composition along the thickness of the ground electrode, as the noble metal content decreases from the precious alloy layer (19) to the ground electrode (21) (paragraph 0022). Therefore the melted and solidified precious alloy layer (19), aka the precious alloy electrode (13), is not entirely blended with the material of the ground electrode, and therefore contains at least a portion free of the ground electrode material.

Mamoru lacks a crystal grain mean diameter of more than 50 micrometers.

However, Mamoru recognizes the need for a long spark plug life (paragraph 0024, line 5) and the suppression of crack formation in the noble metal material (paragraph 0026, line 5).

Regarding claim 8 and 21, Chang teaches a spark plug with an igniter tip made of a noble metal with a mean crystal grain diameter of 250 microns (column 5, lines 36-37). The formation of a tip with grains of this mean diameter helps prevent corrosion and cracking (column 5, lines 29-31).

Regarding claim 9, the mean diameter of the crystal grain is defined as a mean value of a maximum interval between a pair of parallel lines which are tangent to an outline of the crystal grain. Though Chang does not explicitly disclose how the mean diameter is measured, the Examiner takes Official Notice that the diameter of an irregular object is found by measuring the line drawn between two parallel lines at the

extremes of the object. The "mean diameter" is inherently the average of all the data points collected.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Mamoru's spark plug with a tip having an average crystal grain diameter of more than 50 microns in order to provide a spark plug with a more robust tip, as taught by Chang.

Regarding claim 10, Mamoru discloses an igniter made of a material that is a platinum-iridium alloy with a sub-component of nickel (paragraph 0014).

Regarding claim 11, Mamoru discloses a metallic material composing the igniter is made from a platinum-iridium alloy (paragraph 0014). Chang also teaches a metallic material composing the igniter is made from a platinum-iridium alloy (column 5, line 37).

Regarding claim 12, Mamoru discloses a Pt-nickel alloy consisting of 20% of the weight in nickel (paragraph 0017), which falls into the claimed range of 2 to 40%. Chang also teaches a platinum-iridium alloy where iridium is 20% of the alloy, which falls into the claimed range of 2 to 98% (column 5, line 37).

Regarding claim 15, Mamoru discloses the spark plug to be designed in such a way to "prevent the injury on an internal combustion engine," which is intrinsically a gas engine, in which it is mounted (paragraph 0005, line 4).

8. Claims 13 and 14 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Mamoru et al. (JP 06-338376) (of record) in view of Chang et al. (6,045,424) (of

record) as applied to claims 8-12, 15 and 21 above, and further in view of Abe et al. (6,215,234) (of record).

Mamoru discloses a spark plug with all the limitations discussed above but lacks a crystal grain mean diameter of more than 50 micrometers. Chang teaches a crystal grain diameter of more than 50 microns. Both Mamoru and Chang lack a spark discharge gap defined by the range of 0.2 mm to 0.6 mm.

It is well known in the art to lower the required voltage of a spark plug.

Abe teaches a spark discharge gap within a range of 0.2 mm to 0.4 mm (column 2, line 5), which fits within the claimed range of 0.2 mm to 0.6 mm and is therefore not more than 0.6 mm. Abe teaches this spark gap range in order to lower the required voltage for producing sparks (column 2, lines 15-17).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Mamoru's spark plug with a crystal grain diameter of more than 50 microns in order to produce a more hardy igniter, and to further modify it with a spark discharge gap fitting with a range of 0.2 mm to 0.4 mm in order to lower the required voltage to produce sparks, as taught by Abe.

Response to Arguments

9. Applicant's arguments filed May 10, 2005 have been fully considered but they are not persuasive. The applicant has argued that the amended claims are allowable, as the prior art of record fails to teach or suggest an unfused igniter section and a fused weldment section. The claims are rejected under 35 U.S.C. 112, first paragraph, as

failing to comply with the written description requirement, for the reasons given above. Furthermore, the claims are rejected as being unpatentable over the references of the prior art of record for the reasons given above. Therefore the rejections of record are maintained.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sharlene Leurig whose telephone number is (571) 272-2455. The examiner can normally be reached on Monday through Friday, 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

sll

NIMESHKUMAR D. PATEL
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800